भारतीय मानक
Indian Standard

IS 10010 : 2022

वस्त्र रंजक सामग्री — छपाई विधि द्वारा पिगमेंट फैलाव की तीव्रता एवं रंग के मूल्यांकन की विधि

(पहला पुनरीक्षण)

Textile Dyestuffs — Method for Evaluation of Strength and Shade of Pigment Dispersion by Printing Method

(First Revision)

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Textile Speciality Chemicals and Dyestuffs Sectional Committee, TXD 07

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Textile Speciality Chemicals and Dyestuffs Sectional Committee had been approved by the Textiles Division Council.

The pigments for textile printing are marketed in the form of a Dispersion/Suspension of a finely divided pigment in water. The pigment content of such dispersion may vary from product to product.

This standard was first published in 1981. The first revision has been made in the light of experience gained since its publication and to incorporate the following major changes:

a) Title of the standard has been modified;
b) Amendment 1 has been incorporated in the standard;
c) Grade and purity of chemicals used have been specified;
d) Sampling clause has been modified; and
e) References to Indian Standard has been updated.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

Indian Standard

TEXTILE DYESTUFFS — METHOD FOR EVALUATION OF STRENGTH AND SHADE OF PIGMENT DISPERSION BY PRINTING METHOD

(First Revision)

1 SCOPE

This standard prescribes a method for evaluating the strength and shade of a pigment dispersion by printing.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

IS No.	*Title*
1070 : 1992	Reagent grade water – Specification (*third revision*)
1459 : 2018	Kerosene – Specification (*fourth revision*)
1745 : 2018	Petroleum hydrocarbon solvents – Specification (*third revision*)
1781 : 1975	Specification for urea, technical (*first revision*)
6448 : 2018	Diammonium phosphate – Specification (*third revision*)

3 STANDARD DYESTUFF

3.1 The standard sample of pigment dispersion against which the strength and shade of pigment dispersion under test is evaluated, shall be as agreed to between the buyer and the seller.

4 SAMPLING

4.1 Lot — All the containers of the same pigment dispersion and of the same strength delivered to a buyer against a dispatch note shall constitute a lot.

4.2 Unless otherwise agreed to between the buyer and the seller the number of containers to be selected at random from a lot shall be in accordance with Table 1.

Table 1 Sample Size
(*Clause* 4.2)

Lot Size (1)	**Sample Size** (2)
2 to 15	2
16 to 25	3
26 to 50	4
51 to 100	5
101 to 150	6
151 to 300	7
301 and above	8

4.3 It is very important that the contents of each container should be stirred thoroughly for not less than five minutes with a clean stick before sampling. The stirring should be prolonged particularly if settling of the pigment has taken place at the bottom of the container and this can be felt by probing with the stick. After ensuring that the contents in the container are completely homogenized, draw a sample of about 50 g in a clean bottle which should be corked or closed immediately after filling. This shall constitute the

test sample This test sample should be stirred again with a clean glass rod just before weighing for the preparation of printing paste (*see* Note 2 under **A-4.3**).

5 QUALITY OF REAGENTS

Unless otherwise specified analytical reagent grade chemicals with 99.0 percent purity shall be employed in tests and distilled water (*see* IS 1070) shall be used where the use of water as reagent is intended.

6 EVALUATION OF STRENGTH AND SHADE

6.1 Prepare a printing paste of a recommended percentage of a standard pigment dispersion (*see* **3.1**) by following exactly the procedure given in Annex A. Prepare simultaneously a printing paste of the test sample of pigment dispersion using the same percentage as in the printing paste with the standard as also percentages varying by 5 and 10 percent on either side of the recommended percentage.

6.2 Print the printing pastes of the standard and the test sample and also 5 and 10 percent variation prints side by side by machine or screen on a cotton cloth (*see* Annex A) and then dry and fix the prints as detailed out in Annex A. Immediately after printing, give identification marks to the prints After fixing the prints, iron the printed cloth on the reverse before evaluating the strength and shade.

6.3 Make 1:3 reductions of the above printing pastes by using reduction thickening (*see* Annex A) and print them against 1:3 reduction paste of the standard Then dry and fix as in **6.1** and **6.2**.

6.4 Compare carefully the above set of prints (after ironing on the reverse) and determine by visual observation, which of the sample print tallies with the standard print Also find out the variation in shade if any from the standard shade.

NOTE — The strength of the sample should be expressed on the comparisons of printings obtained as in **6.1** and **6.2** The variation in shade should be reported on reduction printings obtained as in **6.3**.

6.5 Calculate the pigment under test by comparing the printings by the following formula:

$$S = \frac{A \times 100}{B}$$

where
S = strength of pigment in percent,
A = depth of printing of the standard pigment, and
B = depth of printing of the pigment under test comparing with that of standard.

7 REPORT

7.1 Report the value obtained as in **6.5** as the strength in percent of the pigment under test as compared to the standard.

7.1.1 Report also the variation in shade in comparison with the shade of the standard.

ANNEX A

(*Clauses* 6.1, 6.2 *and* 6.3)

METHOD FOR PIGMENT PRINTING

A-1 APPARATUS

A-1.1 Balance — Capable of weighing accurately up to 1 mg.

A-1.2 Weighing Scale — Capacity up to 2.5 kg and capable of weighing accurately up to 1 g.

A-1.3 Glass Containers or Beakers — Capacity 200 ml and capable of withstanding high stirring.

A-1.4 High Speed Stirrer (Laboratory Model) — Speed 2000 - 3000 rpm with speed regulator, spindle and agitator blades.

A-1.5 Electric Oven — with an outlet for exhaust gases and heating range up to 160°C.

A-1.6 Electric Iron — One.

A-1.7 Laboratory Sample Printing Machine — with a roller engraved to give vertical stripes when printed. (The width of the stripes should be minimum 1.25 cm and the stripes should be not less than 1.25 cm apart.)

A-1.8 A screen printing table together with a screen and squeegee to give stripe design as in **A-1.7**.

A-2 PRINTING AUXILIARIES

A-2.1 Binder for Pigment Printing — A synthetic resin based on an acrylic copolymer emulsion of the oil in water type. A binder with non-volatile matter content of 30 ± 2 percent should be used.

A-2.2 Soluble Thickening — Carboxy methyl cellulose, preferably of low viscosity giving practically colourless thickening with good flow property and neutral *p*H.

A-2.3 Mineral Turpentine-Solvent — 125/240 (*see* IS 1745).

OR

A-2.4 Kerosene — (*see* IS : 1459)

A-2.5 Diammonium Phosphate Solution — prepared by dissolving diammonium phosphate (*see* IS 6448) in water in the proportion 1 : 3 by mass.

A-2.6 Urea — Technical grade (*see* IS 1781).

A-2.7 Cotton Fabric — The cotton cloth for the printing test should be unmercerized poplin. It shall be fully desized, scoured, bleached and soured. The *p*H of the cloth ready for pigment printing should be neutral or slightly acidic and never alkaline. It shall not be resin finished and shall not be treated with optical whitening agent.

A-3 PROCEDURE

A-3.1 Preparation of Soluble Thickening — Prepare 5 percent thickening by weighing 5 g of carboxy methyl cellulose powder (*see* **A-2.2**) accurately and, gradually sprinkle it over 95 ml of cold water with constant stirring. Allow it to soak overnight This should be sieved through a fine mesh cloth before use.

A-3.2 Preparation of 10 Percent Stock Thickening (Emulsion) — Weigh in a stainless steel or plastic container (capacity about 2 kg) 100 g binder (*see* **A-2.1**) and 100 ml water. Then add to this 50 g soluble thickening (*see* **A-3.1**) and 20 g urea. Mix the ingredients under high speed stirrer with gradual addition of 730 g mineral turpentine or kerosene (*see* **A-2.3** or **A-2.4**) and continue stirring till a homogenous emulsion thickening is obtained. The total mass of the components of mixture shall be 1 000 g.

A-3.3 Preparation of a Printing Paste — Weigh accurately in a glass container or beaker (*see* **A-1.3**), 4 g pigment dispersion (*see* Notes 1 and 2). Then place the beaker containing the pigment dispersion on a weighing scale together with a glass rod for mixing purpose and counterpoised. Add 89 g of 10 percent stock thickening (*see* **A-3.2**) followed by 3 g binder [extra addition to adjust the ratio of colour: binder 1:3 (*see* Note 3)] and mix the whole mixture thoroughly. Add 4 g diammonium phosphate solution. Stir under a high speed stirrer for about 30 to 60 seconds. The paste is then ready for printing. The total mass of ingredients shall be 100 g.

NOTES

1 Normally 4 percent shade for printing shall be used for black pigments it is necessary to have deeper shade and 6 to 8 percent of pigment is taken in preparing of printing paste.

2 Some pigment dispersions on long storage show separation due to settling. Hence all pigment dispersions must be thoroughly stirred before sampling as well as before weighing.

3 The strength of a pigment print also depends among other factors, on the quantity of binder used. Therefore, to get a maximum strength a colour to binder ratio of 1 3 should be maintained and also a minimum of 10 percent binder in 100 parts of printing paste

A-3.4 Preparation of Reduction Printing Paste — To make 1:3 reduction printing paste, weigh in a glass container or a beaker, 25 g printing paste (*see* **A-3.3**) and add to it 75 g of 10 percent stock thickening (*see* **A.3.2**) containing 0.5 ml diammonium phosphate solution and mix initially whole mixture with a glass rod and thereafter stir it for about 60 seconds under a high speed stirrer.

NOTE — For black pigments the reduction paste should contain 0.5 to 1.0 per cent of the pigment

A-3.5 Printing — The printing pastes prepared with the sample and standard in the manner described in **A-3.3** and **A-3.4** are printed side by side in full shade and reduction on plain white cotton cloth pieces (*see* **2.7**) with a sample printing machine or a screen giving uniform and adequate pressure to get even prints. Excessive pressure should be avoided.

NOTE — If the screen printing is used, the concentration of the pigment should be reduced by 2 5 percent than that of the concentration used in roller printing.

A-3.6 Drying — The printed cloth pieces are evenly dried at a temperature of about 80°C in an oven (*see* **A-1.5**) till such time that the dried prints do not retain any trace of mineral turpentine or kerosene.

A-3.7 Fixing (Curing) — The dried prints are fixed by curing the prints at a temperature of 140°C for 5 minutes. The prints should not smell of kerosene/mineral turpentine when they are ready for curing. Over-curing should be avoided since in certain cases it causes a dullening of the prints.

ANNEX D
(*Foreword*)

COMMITTEE COMPOSITION

Textile Speciality Chemicals and Dyestuffs Sectional Committee,
TXD 07

Organization	*Representative(s)*
Department for Jute and Fibre Technology Institute of Jute Technology, University of Calcutta, Kolkata	PROF A K SAMANTA (***Chairman***)
Ahmedabad Textile Industry's Research Association,	SHRIMATI DEEPALI PLAWAT SHRIMATI FAHIMUNNISA KHATIB (*Alternate*)
Ama Herbals Laboratories Pvt Ltd, Lucknow	SHRI Y A SHAH
Archroma India Pvt Limited, Mumbai	SHRI RAJESH RAMAMURTHY SHRI ASHIM GHOSH (*Alternate*)
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ICAR – Central Institute for Research on Cotton Technology, Mumbai	DR SUJATA SAXENA DR A S M RAJA (*Alternate*)
Department for Jute and Fibre Technology Institute of Jute Technology, University of Calcutta, Kolkata	DR D DAS
Global Organic Textile Standard, (GOTS), Thane	SHRI RAHUL BHAJEKAR MS PRACHI GUPTA (*Alternate*)
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The Bombay Textile Research Association, Mumbai	DR PADMA S VANKAR SHRI M P SATHIANARAYANAN (*Alternate*)
The South India Textile Research Association, Coimbatore	DR PRAKASH VASUDEVAN SHRI S SIVAKUMAR (*Alternate*)
The Synthetic and Art Silk Mills Research Association, Mumbai	SHRIMATI (DR) MANISHA MATHUR SHRIMATI ASHWINI SUDAM (*Alternate*)
U P Textile Technology Institute, Kanpur	DR ARUN PATRA
Wool Research Association, Thane	SHRIMATI SMITA BAIT SHRIMATI (DR) MRINAL CHOUDHARI (*Alternate*)
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Review of Indian Standards

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